Preparation and characterization of composites based on textile waste

Priprema i karakterizacija kompozita na bazi tekstilnog otpada

V. Srebrenkoska, G. Demboski*, G. Bogoeva Gaceva*, S. Krsteva

Faculty of Technology, Goce Delčev University, "Krste Misirkov" b.b. P. O. Box 201, 2000 Štip, Republic of Macedonia
Faculty of Technology and Metallurgy, Sts.Cyril & Methodius University, MK-1000 Skopje, Republic of Macedonia*

Abstract

The aim of this work was investigation of the possibilities of reusing of cotton textile waste, generated during the manufacture in textile industry, as reinforcement in production of composite materials.. The materials used as reinforcement for phenol phormaldehyde resin as matrix have been cotton fabric and cotton textile waste. The composites containing 60 % wt. reinforcement were manufactured by coventional process of compression molding (at pressure of 75 bar and temperature 160 °C). The mechanical and thermal properties of the produced materials based on textile waste were analyzed and compared to those of commonly used continuous fiber reinforced composites based on cotton fabric and phenolic resin. It was found that the composites based on cotton textile waste are more sensitive to processing cycles with respect to continuous fiber reinforced composites. The mechanical properties of the composites based on cotton textile waste were lower for about 25%, although the thermal stability (determined by Martens method) for both composites reinforced with cotton fabric and with cotton textile waste was similar. The obtained results have shown that cotton textile waste could be reused for production of composites with acceptable mechanical properties, and they could be applied in many industries as construction material with moderate mechanical properties.

Experimental

- ***60% wt. of cotton textile waste as a reinforcements***

Different and irregular shapes and sizes of cotton waste fabric from (25 x 50) mm to (50 x 500) mm and larger, purified from various admixtures and impurities.

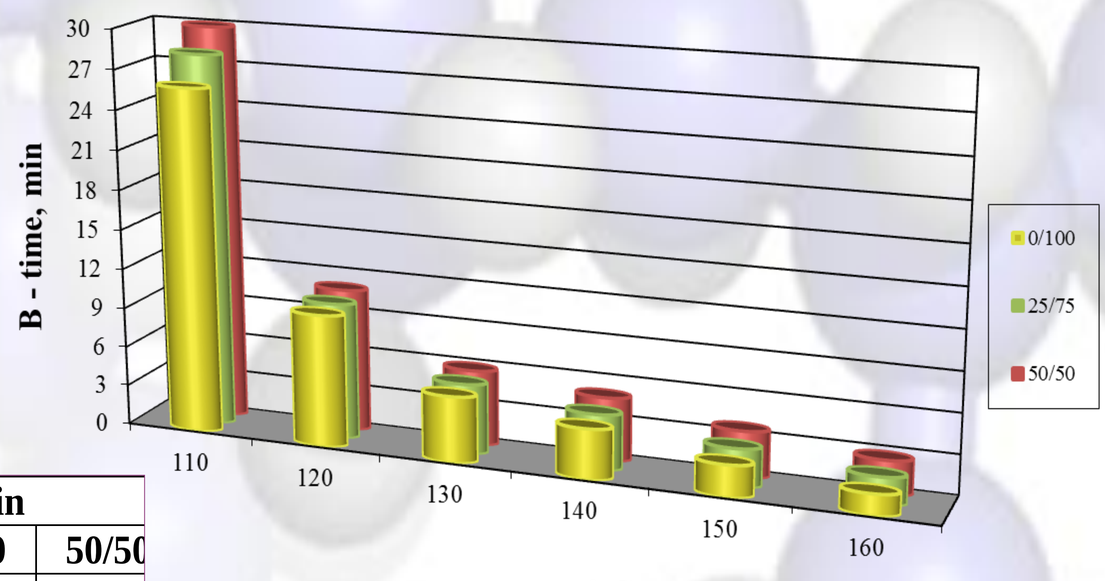
- ***40% wt. of phenol formaldehyde resin as a matrix***

Phenol formaldehyde resin was modified with thermoplastic polyvinylbutiral (PVB) and diluted with alcohol in relation 1:0,2-0,5.

Characteristics of the polymer systems

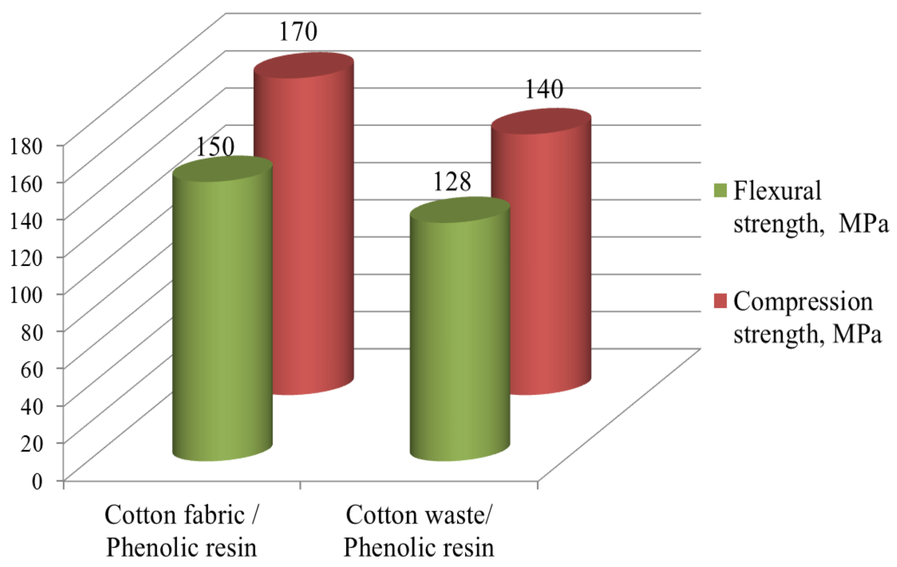
Characteristics	PVB/phenolic formaldehyde resin					
	10/90	20/80	25/75	30/70	40/60	50/50
Content of dry substance, mas. %	15,2	14,8	14,6	15,2	16,3	16,1
Density at 20 ° C, g/cm^3	1,11	1,10	1,11	1,11	1,12	1,12
Viscosity at 20 ° C according to Ford (4 mm / 20 ° C), s	220	210	215	225	195	210

B- time of phenol-formaldehyde resin modified with PVB at various temperatures

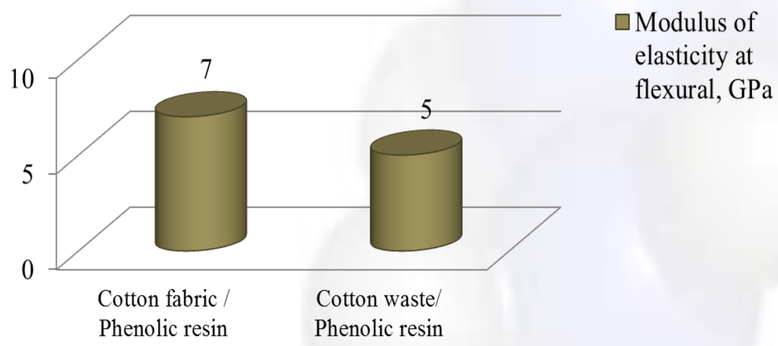


Physical and mechanical properties on the composites based on cotton textile wastes versus laminated composites

Flexural and Compression strength, MPa



Modulus of elasticity at flexural, GPa



Impact strength, kJ/m²